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DOOR AND GUIDE RAIL ARRANGEMENT

The invention pertains to a door according to the introductory clause of Claim 1.

Doors of this type are used in the form of garage doors and industrial gates. The door leaf can consist of a plurality of panels, which are hinged to each other along axes which are perpendicular to the rail element. In these types of doors, also called sectional doors, the door leaf is in a more-or-less vertical plane when in the closed position and is usually in an overhead horizontal position when in the open position. So that the door leaf can be guided between the closed position and the open position, a guide rail arrangement is provided. This arrangement has at least one rail element which is more-or-less vertical and parallel to the lateral edge of the door leaf when the door is closed; a rail element which extends overhead in a more-or-less horizontal direction and is parallel to the edge of the door leaf when the door is open; and a circular arc-shaped

rail element, which connects these other two rail elements. The more-or-less vertical rail element can be attached by a plurality of angle-shaped fastening elements to the wall containing the opening to be closed by the door leaf.

To assist the opening movement of the door leaf, a counterbalancing device is usually provided in the form of, for example, a tension spring or torsion spring arrangement, which is tensioned during the course of the closing movement and relaxed again during the course of the opening movement. The counterbalancing device is usually connected to the door leaf by tensioning means attached to the lower edge of the door leaf. During the operation of doors of this type, it is possible for the user to be injured by coming into contact with the tensioning means when reaching into the gap formed between the more-or-less vertical rail element and the wall. To solve these problems, so-called angle frames with two sidepieces are usually used. The sidepieces extend over the entire length of the more-or-less vertical rail element and form an angle of approximately 90° with each other. The first sidepiece is attached to the wall, the second to the rail element, so that the second sidepiece makes it impossible for anyone to reach into the gap

formed between the rail element and the wall. Doors with these types of angle frames are described in, for example, DE 10 113 847. Pressed-out sections are also provided in the angled frame, with the help of which, in cooperation with a latching bolt attached to the door leaf, it is possible to prevent the door leaf from moving when such movement is not desired. It is thus possible effectively to prevent the door from dropping and also to prevent it from being raised.

Nevertheless, it has been found that it is comparatively complicated and therefore correspondingly expensive to install these types of doors in which the rail element is attached to the wall by an angle frame. Doors according to the introductory clause of Claim 1 are also indicated in EP 1 114 908 A2. Sliding doors with a protective element assigned to a guide rail arrangement are described in US 5,398,902.

In view of these problems of the state of the art, the invention is based on the task of providing a door of the type described above which, first, can be installed easily and which, second, can be operated without risk of injury, and also on the task of providing a guide rail arrangement for a door of this type.

These tasks are accomplished according to the invention by an elaboration of the known doors indicated in the characterizing clause of Claim 1.

These types of doors are especially easy to install, because the rail element with the individual fastening elements can be attached to the wall without the use of bulky and difficult-to-handle angle frames. The risk of injury from doors according to the invention is reduced in that, after the rail element has been mounted on the wall by means of the fastening elements, a protective element, which bridges the gap between the rail element and the wall, is attached to the rail element and/or to at least one of the fastening elements and thus prevents anyone from reaching into this gap and running the risk of injury from contact with the tensioning means.

For the purpose of making it easier and less expensive to install and remove an inventive door, it has been found to be especially favorable for the protective element to be removably attached to at least one of the fastening elements and/or to the rail element.

The fastening elements of the inventive doors are in the form of angle pieces with two sidepieces enclosing an angle of

preferably about 90° with each other, where the first sidepiece can be attached to the wall and the second to the rail element. It is very easy according to the invention to connect the protective element positively to the fastening element without the use of additional components by providing the second sidepiece with a receiving area to receive a fastening area of the protective element, where the receiving area is in the form of a pressed-out section in the second sidepiece. In this case, the protective element can be secured very reliably to the fastening element by providing a boundary surface of the fastening area with a profiling which arrives in contact with a boundary surface of the second sidepiece of the fastening element and which opposes the separation of the protective element from the fastening element. This profiling can be in the form of hooks or simple webs which taper to a point on the boundary surface of the fastening area.

To improve the visual appearance and to achieve a further increase in the operating reliability of the inventive door, it is preferable for the protective element to have a cover area, where an intermediate space, which is designed to receive fastening elements serving to fasten the rail element to the

second sidepiece, is formed between a boundary surface of the second sidepiece of the fastening element opposite the rail element and the cover area. The fastening means used to fasten the rail element to the second sidepiece can be in the form of screw bolts passing through the rail element and the second sidepiece with nuts screwed onto them, where these nuts can be accommodated in the intermediate space formed between the cover area and the second sidepiece of the fastening element. This has the effect of reducing the risk of injury from the nuts, which would otherwise be exposed.

The protective element of an inventive door has no load-bearing function. Therefore, it can be produced inexpensively out of plastic. As already explained above, this invention can be used to particular advantage in sectional doors, in which the door leaf has a plurality of panels, which are hinged to each other along axes which are more-or-less perpendicular to the rail element.

The invention is explained below with reference to the drawing, to which explicit reference is made with respect to all of the details which are essential to the invention but not discussed in detail in the specification. The single figure of

the drawing shows a horizontal cross section through an inventive door in the area of the more-or-less vertical rail element.

The door shown in the drawing comprises a door leaf with a plurality of panels hinged to each other, only one of these panels 10 being shown in the drawing; a guide rail arrangement with a more-or-less vertical rail element 20 parallel to the lateral edge of the door leaf when the door is closed; a plurality of fastening elements 30 for attaching the rail element to a wall containing the opening to be closed by the door leaf; and a protective element 40.

A guide roller 12, which is held in the rail element 20, is attached to the panel 10, so that the movement of the door leaf can be guided by the guide roller 12 accommodated in the rail element 20. The fastening element 30 is designed in the form of an angle piece with a first sidepiece 32, which is attached by means of a screw 33 to the wall, and a second sidepiece 34, which forms a right angle to the sidepiece 32. To attach the rail element 20 to the second sidepiece 34 of the fastening element 30, two screws 35 in all are provided, which pass through the rail element 20 and this second sidepiece 34. Nuts

are screwed onto the ends of these screws 35 facing away from the rail element 20 to ensure a reliable attachment of the rail element 20 to the second sidepiece 34 of the fastening element 30. The rail element 20 is attached to the wall by a plurality of fastening elements 30 of the type shown in the drawing, where a predetermined spacing is maintained between the individual fastening elements 30.

To bridge the gap remaining between the rail element 20 and the wall, a protective element 40 is provided. This protective element 40 can be pushed onto the fastening elements 30 after the rail element 20 has been fastened to the wall by means of the fastening elements 30. For this purpose, the second sidepiece 34 of the fastening element 30 has a pressed-out section 36, which forms a receptacle for a fastening area 42 of the protective element 40. This fastening area 42 is designed in the form of a web, which is more-or-less parallel to the second sidepiece 34. On the boundary surface facing the second sidepiece 34, the fastening area 42 is provided with a profiling in the form of webs 43, which taper down to a point; these webs prevent the protective element 40 from being pulled out of the receptacle formed by the pressed-out section 36. Adjacent to

the fastening area 42, the protective element 40 has an outward-slanting web 45, which merges with a web 44, parallel to the second sidepiece 34; the web 44 merges in turn with a web 48 extending toward the second sidepiece 34. This has the result of creating a cover area, which, together with the boundary surface of the second sidepiece 34 opposite the rail element 20, creates an intermediate space 50, in which the nuts 35 are accommodated. In addition to the cover area, the protective element has a protective area 46, which proceeds from the sidepiece 45 toward the wall, parallel to the second sidepiece 34 of the fastening element 30; this protective area bridges the gap formed between the rail element and the wall. Because the protective element 40 has no load-bearing function, it can be produced of plastic in the inventive embodiment shown in the drawing.

The invention is not limited to the exemplary embodiments explained on the basis of the drawing. On the contrary, it includes the use of protective elements which are attached materially or nonpositively to the fastening element and/or to the rail element. In addition, the protective element can also be designed without a cover area. In this case, it is advisable

for the protective element to be realized in the form of a U-shaped profile, one of the sidepieces of the protective element being accepted positively in a receptacle of the fastening element, while the other, longer sidepiece of the protective element bridges the gap formed between the rail element and the wall.

CLAIMS

1. Door with a door leaf which can be moved between an open position and a closed position; with a guide rail arrangement to guide the movement of the door leaf; with a fastening arrangement for attaching a rail element of the guide rail arrangement to a wall containing the opening to be closed by the door leaf, the fastening arrangement comprising a plurality of fastening elements, each of which can be fixed on one side to the wall and on the other side to the rail element; and with tensioning means, which can be fixed in position at one end to the door leaf and at the other end to a drive device and/or a counterbalancing device, where at least one of the fastening elements is designed essentially in the form of an angle piece with two sidepieces preferably enclosing an angle of 90° with each other, and where a the first sidepiece can be attached to the wall, the second sidepiece to the rail element, characterized in that the guide rail arrangement is provided with at least one protective element, which can be attached to at least one of the fastening elements and which serves to bridge the gap between the rail element and the wall, and in

that the second sidepiece has a receiving area in the form of a pressed-out section to accept a fastening area of the protective element.

2. Door according to Claim 2, characterized in that the protective element can be removably attached to at least one of the fastening elements and/or to the rail element.

3. Door according to Claim 1 or Claim 2, characterized in that a boundary surface of the fastening area has a profiling, which arrives in contact with a boundary surface of the second sidepiece and prevents the protective element from separating from the fastening element.

4. Door according to one of the preceding claims, characterized in that the protective element has a cover area, where, between a boundary surface of the second sidepiece opposite the rail element and the cover area, an intermediate space is formed, which is designed to receive the fastening means serving to attach the rail element to the second sidepiece.

5. Door according to one of the preceding claims, characterized in that the protective element consists at least partially of plastic.

6. Door according to one of the preceding claims, characterized in that the door leaf has a plurality of panels, which are hinged to each other with axes extending more-or-less perpendicular to the rail element.

7. Guide rail arrangement for a door according to one of the preceding claims with a rail element, which can be attached to a wall; with a fastening arrangement with a plurality of fastening elements, which can be attached on one side to the wall and on the other side to the rail element; with at least one protective element, which can be attached to the rail element and/or to at least one of the fastening elements and which serves to bridge the gap formed between the rail element and the wall, where the first sidepiece can be attached to the wall, the second sidepiece to the rail element, characterized in that the second sidepiece has a receiving area in the form of a pressed-out section to accept a fastening area of the protective element.